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Thistles: Canada Thistle and Perennial Sowthistle

Cooperative Extension South Dakota State University

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FS 450
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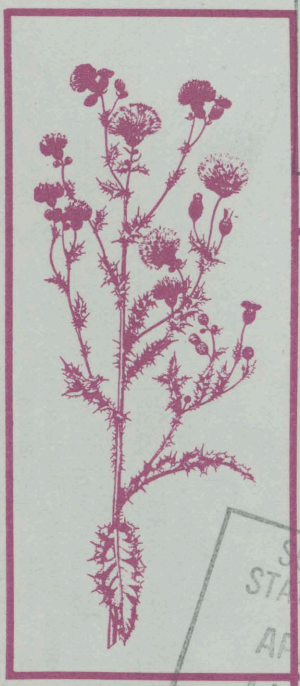
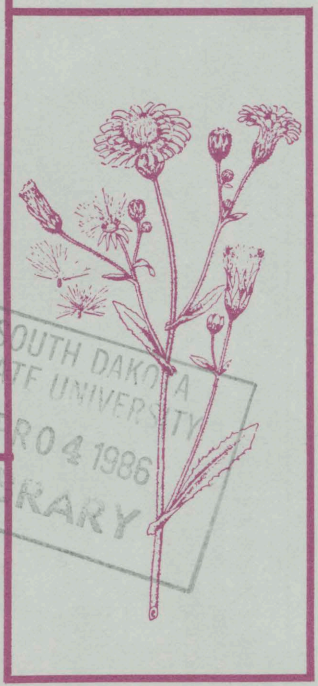
Thistles



Canada Thistle



Perennial Sowthistle

Cooperative Extension Service
South Dakota State University
U.S. Department of Agriculture

Thistles Canada Thistle and Perennial Sowthistle

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Canada thistle, *Cirsium arvense L.*, and perennial sowthistle, *Sonchus arvensis L.* and *S. ulignosus* Bieb, are deep-rooted perennials that spread by seed and underground parts. They emerge later in the spring and are less difficult to kill than leafy spurge, Russian knapweed, or hoary cress.

"Less difficult" doesn't mean easy to kill. The underground parts of thistles may persist through the most intense topgrowth eradication efforts. And if one stray thistle has been overlooked, it's very likely that next year several new thistles will appear.

Thistle flowers are cross-pollinated, so they must be open before seed can be produced. Seeds are ready to germinate 8 to 10 days after flowers have opened. Each seed is attached to a tiny parachute that can be carried miles by air currents.

Thistles reduce crop yields. Two Canada thistle plants per square yard have been known to reduce wheat yield 18%; 19 plants per square yard reduced yield 36%. A patch of sowthistles reduced oat yield 69%.

Some Canada thistle plants are susceptible to 2,4-D, some are resistant, and some are intermediate in reaction to the herbicide. Spraying kills susceptible plants, but resistant plants will remain and produce more resistant plants.

To reduce stands 75 to 90%

Intensive cultivation

Cultivate every 3 weeks during good growing conditions in June and July. Generally, cultivation can be spread to 4-week intervals during hot, dry weather when plants are growing less rapidly during August, September, and October.

Cultivation from spring until freeze-up will kill a high percentage of thistle plants. However, cultivation from immediately after harvest of small grain one year until freeze-up the next year is more effective.

A field cultivator equipped with sweeps or a blade implement is most satisfactory; a one-way disk is also fairly effective. Sweeps (12 to 60 inches) should overlap 3 to 4 inches. Each thistle root must be cut by each cultivation. Keep the sweeps sharp; be sure they are flat when in the soil and that they are operating at a depth of 4 to 5 inches.

It takes 10 to 15 days for new shoots to emerge after roots have been cut. Another 10 to 15 days go by before there are enough leaves to produce more food than is needed for growth. Keep to your cultivation schedule; the food supply in the roots will eventually be depleted and the plants will die.

Spraying and cultivating small grain

Combining intensive cultivation for part of the season with the production of a crop and chemical application is generally more practical than committing yourself to an entire season of cultivation. Several systems based on SDSU experimental tests are outlined.

Use ¾ lb/A of 2,4-D amine or MCPA when grain is in the five-leaf stage to kill susceptible plants, prevent seed production, and weaken resistant plants. After harvest use a treatment that will kill plants that were weakened.

There are several after-harvest systems to consider.

Spraying only. Spray in the grain with ¾ lb/A of 2,4-D amine. In experimental tests, one application in small grain reduced the stand 30% (Table 1). A second application after harvest reduced the stand an additional 30 to 40%, giving a total stand reduction of 60 to 70% at the end of one season.

This system is less effective than fall cultivation because spraying kills only susceptible thistles. And in seasons when poor fall growing conditions exist, fall spraying is less effective than tillage.

Spraying and cultivation. A better system is spraying in the grain with ¾ lb/A of 2,4-D amine to reduce stands 30% and then cultivating three to four times after harvest.

A stand of thistles was reduced an additional 58% when the stubble was plowed shortly after harvest and cultivated two times in September. This reduced the stand of thistles 88% after one season, and 100% after two seasons.

A cultivator equipped with wide sweeps for all three cultivations would probably give the same results and would leave crop residue on the surface to reduce erosion.

Other systems. Other systems involve fall plowing.

Plowing shortly after harvest and spraying the thistles that emerged from the plowing was as effective (at 88% stand reduction) as plowing and two cultivations. Some years it will be less useful, as thistles will not emerge soon enough to be sprayed.

Another system is to spray in the stubble and plow in October. In experimental tests, spraying with 2,4-D in the grain and again in the stubble reduced the stand 79%. Following this with late fall plowing gave an additional 10% elimination, for a one-year total of 90%. (Late fall plowing leaves the soil bare over winter.)

Cultivation and summer crops

Cultivate with a sweep cultivator or blade three times before seeding close-drilled soybeans, forage sorghum, sudangrass, or buckwheat during late June. After harvest, fall plow and cultivate once or twice. This reduces the stand of thistles 75 to 80% in one year.

Cultivation and forage crops

Cultivate with a sweep cultivator or blade every 3 weeks between June 1 and August 15. Seed alfalfa or a mixture of alfalfa and a perennial grass. The stand of thistles is generally reduced 80 to 90%.

Cultivation before seeding is essential to reduce competition.

To reduce stands 10 to 50%

Small grain and 2,4-D or MCPA

Use ¾ lb/A of 2,4-D or MCPA in spring grain. Spray again after harvest. In SDSU tests, the first

spraying reduced the stand about 30%. Another spraying about 2 weeks after harvest with ¾ lb/A of 2,4-D reduced the stand an additional 30 to 40%.

It is seldom advisable to use this practice more than one year out of three. Two sprayings generally kill most of the susceptible plants, but allow resistant plants to reproduce. Better results may be obtained by using MCPA for one spraying and 2,4-D for the other.

Corn or sorghum and 2,4-D

Spray corn or sorghum twice a year. For either crop, use ½ lb/A 2,4-D amine when the thistles have emerged. Spray again after corn has tasseled or sorghum has headed. In experimental tests, this system reduced thistle stand 10 to 30%.

Don't use this system more than 2 years out of 3, because resistant plants will build up.

Corn and Banvel

Tests indicate spraying with ¼ to ½ lb/A Banvel (common name dicamba) gives equal or slightly better Canada thistle control than one application of 2,4-D. There appears to be less risk of crop injury than from 2,4-D.

Rate of ½ lb/A may be applied when the corn is at the spike to 5-inch stage. Rate of ¼ lb/A may be used until the crop is 36 inches or not later than 15 days before tassel. Use drop nozzles for better weed coverage after the corn becomes 8 inches tall. Avoid drift to susceptible crops such as soybeans.

Alfalfa

A good stand of alfalfa or alfalfa-grass mixture reduces the stand of thistles 10 to 20% each year. Two years of alfalfa or alfalfa-grass mixture is useful as a follow-up for a system that includes a season of cultivation and a fall seeded crop.

Perennial grass and 2,4-D

Spray smooth bromegrass or wheatgrass with ¾ lb/A of 2,4-D or MCPA when thistles are starting to bud and again in August. This system has reduced the stand of thistles 10 to 25% each year. It is useful as a follow-up for a system that includes a season of cultivation prior to seeding grass. Two sprayings a year in grass that is already established seldom give 100% elimination, even when repeated for several years.

Prevent spreading

Spraying once a year with ½ lb/A of 2,4-D in small grain, corn, sorghum, or perennial grass reduces the stand of thistles slightly and keeps them from spreading.

Prevent seed production

Preventing seed production is more important in controlling thistles than in most noxious weeds. Since a high percentage of seeds are ready to germinate after flowers have been open 8 to 10 days, mowing **cannot** be delayed more than one week after bloom. Spraying with 2,4-D must be done before bloom.

Three-year programs

A total of 56 combinations of crops, cultivations, and sprayings was tested in SDSU experiments. Fifty treatments reduced the stand of thistles over 90%. Half of the treatments gave complete elimination. Results from several combinations are given in Table 1.

Small patch control, pasture and non-cropland

Some herbicide treatments are intended to give 90 to 100% elimination of thistles in grassland or non-crop areas such as roadsides. They are primarily for small infestations. Treatments listed in Table 2 may be applied in spring or fall.

Treat an area 6 to 8 feet beyond the outside of the patch. Use 2,4-D to control seedlings and stragglers emerging the following season.

Tordon will damage bromegrass; bluegrass is tolerant. Do not harvest grass or graze dairy cattle for 2 weeks after application. Animals should be removed 3 days before slaughter if grazing treated areas within 2 weeks of spraying.

Banvel will damage bromegrass. Treated areas should not be grazed by lactating dairy animals for 60 days. Hay for dairy should not be harvested for 90 days after application. Meat animals should be removed from treated areas 30 days before slaughter.

FOLLOW THE LABEL

Herbicide rates in research in this publication are specifically for perennial weeds. Labels for some products may include only lower rates.

Federal regulations make it unlawful for any person to use an herbicide in a manner inconsistent with its labeling. This includes the kind of crop and weed; rate, carrier, and other application directions; storage, disposal, and protective clothing; or other precautions stated.

Table 1. Average percentage of Canada thistle killed in 3 years.

First year		Second year		Third year	
Treatment*	% kill	Treatment*	% kill	Treatment*	% kill
Grain; 2,4-D 6/7	30	Same as 1st year	40	Same as 1 st year	50
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Same as last year	100	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Corn; 2,4-D 6/20 and 8/20	95	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Cult. 6/7 and 6/20; Sudan	99	Flax; ¼ lb MCPA	99
Grain; 2,4-D 6/7; plow 8/11; 2,4-D 9/25	88	Same as 1st year	98	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; 2,4-D 9/25	88	Corn; 2,4-D 6/20 and 8/20	98	Same as 1st year	100
Grain; 2,4-D 6/7 and 8/25; plow 10/15	89	Same as 1st year	100	Same as 1st year	100
Grain; 2,4-D 6/7 and 8/25; plow 10/15	89	Corn; 2,4-D 6/20 and 8/20	92	Same as 1st year	98
Cult. 6/7, 6/28, 7/19, 8/9; alfalfa 8/15	88	Harvest hay	98	Harvest hay	100
Cult. 6/7, 6/28, 7/19, 8/9; brome 8/15	88	Harvest hay	93	Harvest hay	100
Alfalfa underseeded in oats; clip 6/20	62	Harvest hay	89	Harvest hay	100

*All 2,4-D applications were at the rate of ¾ lb/A of an amine form; cultivations were performed with duckfoot cultivator equipped with 12-inch sweeps. Spraying and cultivating were done on dates designated.

Table 2. For small patches of Canada thistle and perennial sowthistle.

	Amount per acre	Amount per square rod	Cost per square rod
Banvel	2 gal	1.6 fl oz (10 tsp)	$ .75
Tordon 22K	¾ gal	0.6 fl oz (4 tsp)	.45
Tordon 2K	120 lb	¾ lb (2 cups)	1.05

tsp = teaspoon

Acknowledgment:
Based on original publication and research conducted by Lyle A. Derscheid, Weed Research Project and Extension Agronomist, SDSU.

Canada Thistle Control

The most effective treatments or those that fit most situations are outlined below. Refer to product labels and to appropriate fact sheet for crop use limitations and complete directions. Herbicide cost is based on average suggested retail prices. Treatments are listed by tradename and amount of product per acre. The common name and amount of active ingredient or acid equivalent (act) are listed in italics in ( ).

CROP	HERBICIDE	RATE/ACRE	REMARKS
Corn	Banvel 4L *(dicamba)*	½-1 pt *(¼-½ lb act)*	EARLY POSTEMERGENCE. Rates to 1 pt/A may be applied when corn is at the spike to 5-inch stage. Best program when Canada thistle emerges before the crop. Good spot treatment program. $7.50/A
		½ pt *(¼ lb act)*	POSTEMERGENCE. Rate of ½ pt/A may be applied before corn is 36 inches tall but not later than 15 days before tassel. Drop nozzles after corn is 8 inches tall improve coverage and reduce risk of injury. $3.75/A.
	Banvel 4L + 2,4-D amine 3.8L	½ pt + ¼-½ pt *(1/4+1/8-1/4 act)*	EARLY POSTEMERGENCE. Use drop nozzles after corn is 6 to 8 inches tall. Do not apply after corn is 36 inches tall or later than 15 days before tassel. Ester form of 2,4-D not recommended. $4.00-4.25/A.
	2,4-D	1 pt amine *(½ lb act)* ½ pt ester 3.8 lb *(¼ lb act)* ⅓ pt ester 5.7 lb *(¼ lb act)*	POSTEMERGENCE. Use drop nozzles after crop is 6 to 8 inches tall. Adjust rate for amine or ester formulation. Amine preferred. $1.00/A.
		1 qt 3.8 lb *(1 lb act)*	HARVEST AID. Apply after corn is dented. Apply 1 qt/A of amine or ester (3.8 lb) form or ⅔ qt/A of ester (5.7 lb) form. Provides an excellent program to reduce infestations. Use high clearance or aerial equipment as labeled. $2.75/A.
Oats	MCPA 4L	½-3 pt *(¼-1½ lb act)*	POSTEMERGENCE. Apply when oats are at the 3- to 4-leaf stage. Amine or ester form available. Rate of 1 pt/A suggested for most annual weeds; however, rates of 1½ to 2 pt/A improve thistle control, especially in heavy infestations. Rates over 1 pt/A may cause crop injury. Better crop tolerance to high rates than with 2,4-D. $1.85-3.10/A.
Wheat and Barley	2,4-D amine 3.8L	½-2 pt *(¼-1 lb act)*	POSTEMERGENCE. Apply when crop is at 5-leaf to early boot stage. Rates of 1 pt/A is considered maximum for most annual weeds. Rates of 1½ pt/A 2,4-D amine or 1½ to 2 pt/A MCPA amine or ester will improve thistle control if risk of some injury is assumed. Better crop tolerance at high rates to MCPA than to 2,4-D. Preferred treatment. $1.00-5.50/A.
	MCPA amine 4L or MCPA ester 4E	½-3 pt *(¼-1½ lb act)*	
	Banvel 4L + MCPA amine 4L	¼ pt + ¾ pt *(1/8+3/8 lb act)*	POSTEMERGENCE. Spring wheat only. Apply at the 2-to 4-leaf crop stage. Thistles may not be emerged sufficiently for best results. Do not apply late. $3.25/A.
Flax	MCPA amine 4L	½-1 pt *(¼-½ lb act)*	POSTEMERGENCE. Apply when crop is 3 to 6 inches tall. Rate of ¾ pt/A for ester and 1 pt/A for amine forms suggested for best results; however, some crop injury may be noted. Usually prevents thistle seed production. Expect fall regrowth. Not labeled as preharvest treatment. $.90-1.80/A.
	MCPA ester 4E	½-¾ pt *(1/4-3/8 lb act)*	

CROP	HERBICIDE	RATE/ACRE	REMARKS
Soybeans	Basagran 4L *(bentazon)*	1 qt *(1 lb act)*	POSTEMERGENCE. Apply when Canada thistle is 8 inches to bud stage. Retreat 7 to 10 days later for best results. Less effective if weeds are under drought stress. Apply in 20 gpa and use minimum 40 psi pressure. Late season regrowth may be noted. Crop oil concentrate at 2 pt/A may be added. $27.25/A.
Grass Pasture	2,4-D amine 3.8L	1 qt *(1 lb act)*	POSTEMERGENCE. Apply at pre-bud stage of thistles. Ester formulation at ¾ lb/A acid equivalent may be used if growing conditions are less favorable. Plan to retreat in fall. Expect 10 to 20% stand reduction with two applications per year. Do not graze dairy cattle on treated areas for 7 or 14 days after application (check product label). $2.00/A.
	Banvel 4L *(dicamba)*	1-4 pt *(½-2 lb act)*	POSTEMERGENCE. Apply at pre-bud stage of thistles. Rates of 1 to 2 pt/A intended for suppression and some stand reduction. Rates of 2 to 4 pt/A usually provide 50 to 75% stand reduction. Higher rates may damage bromegrass. Plan to treat the next spring. Fall retreatment usually not required. Do not graze treated areas with lactating dairy for 21 or 40 days or harvest hay for 51 to 70 days after application for the 2 or 4 pt/A rate, respectively. Meat animals should be removed from treated areas 30 days before slaughter. $7.50-30.00/A.
	Banvel 4L + 2,4-D amine 3.8L	*1-2 pt*+1-2 qt *(½-1+1-2 lb act)*	POSTEMERGENCE. Tank-mix. Apply at pre-bud stage of thistles. Provides better control than for 2,4-D alone. May require fall retreatment some seasons. Refer to Banvel section for use restrictions. $9.50-19.00/A.
	Tordon 22K 2L *(picloram)*	1 qt *(½ lb act)*	POSTEMERGENCE. Apply at early bud stage of thistles. Provides 50-75% stand reduction. Fall retreatment not required. Expect bromegrass stand loss. No grazing restrictions. Do not contaminate water. RESTRICTED USE PESTICIDE. State SLN label. $23.75/A.
	Tordon 22K 2L+ 2,4D amine 3.8L	1 pt+1 qt *(¼-1 lb act)*	POSTEMERGENCE. Tank-mix. Apply at pre-bud stage of thistles. Intended as a 3- to 4-year program. Do not graze dairy cattle for 7 or 14 days after application (check product label). Do not contaminate water. RESTRICTED USE PESTICIDE. State label. $13.90/A.
Shelterbelts	Roundup 3L *(glyphosate)*	2-3 qt *(1½-2¼ lb act)*	POSTEMERGENCE. Apply to actively growing thistles at bud stage. Fall application more effective than spring. Use caution to avoid spray droplet drift to contact any actively growing tissue on tree leaves, branches or trunk. For hand sprayers, mix 5 tablespoons per gallon of water. Best choice for shelterbelts. $45.00-67.50/A.
	Cytrol, Amitrole T 2L *(amitrole)*	2 gal *(4 lb act)*	POSTEMERGENCE. Labeled for non-crop areas. Best control when applied at bud stage. Application on 6- to 8-inch weeds frequently gives only top kill. Results have been excellent by treating regrowth after mowing. Non-selective. Avoid spray droplet drift contact to trees. $40.00/A.
	2,4-D	1 qt (4 lb) 1.1 lb 90 SP *(1 lb act)*	POSTEMERGENCE. Apply at early bud stage. Use only very low volatile formulation such as amine salts, oil soluble amine, or lithium salt (90% soluble powder). Avoid spray or drift contact to tree foliage. Plan to retreat in fall. $2.00/A.
Cultivated Cropland	Before planting, after harvest, fallow, between crops.		
	FALL SPRAYING. Spraying in fallow or after harvest is usually more effective in fall than in spring or mid-summer. Fall spraying is effective when there has been adequate moisture and time to promote 6 inches of new, active regrowth on some rosettes. Light frost does not reduce effectiveness; spraying after frost often is the best time to spray if the leaves are not damaged. It's best not to till after harvest before spraying; however fields tilled immediately after harvest may be sprayed in very late fall if rainfall has been adequate for regrowth. Allow at least 7 days before cultivation. Tillage is a better choice in dry fall seasons.		
	SPRING/SUMMER SPRAYING. Herbicide used before early planted crops gives only topgrowth suppression. Cultivation is nearly as effective and costs less than many herbicide treatments. Spraying before soybeans or sorghum may be slightly more effective. Thistles should be at bud stage for mid-season applications in fallow or set aside. Herbicides before planting are more important and more effective in reduced till, no-till or ridge-till. Thistles emerge earlier in reduced tillage systems. Fields to be treated in the spring should not be tilled in late fall or early spring before spraying.		
	2,4-D amine 3.8L	1-2 qt *(1-2 lb act)*	POSTEMERGENCE. Lower cost per acre than other choices. May be applied to actively growing weeds anytime during the season. Late fall applications in fallow or after harvest when plants have at least 6

CROP	HERBICIDE	RATE/ACRE	REMARKS
Cultivated Cropland (continued)	2,4-D amine 3.8L	1-2 qt *(1 -2 lb act)*	inches of active fall regrowth is more effective than spring or mid-summer applications. Amine preferred. Ester form may be used if fall conditions are unfavorable. Rate of 1 qt/A suggested for most situations. High rate has improved results from late fall treatments. Application before corn planting gives topgrowth control only. Not labeled for use before planting soybeans, sunflowers, or other susceptible crops. There appears to be little risk of injury from 1-1½ pt/A of ester forms if at least 7-10 days elapse between application and planting these crops. $2.00-4.00/A.
	Banvel 4L *(dicamba)*	2-4 pt *(1-2 lb act)*	POSTEMERGENCE. Provides better control than 2,4-D. Most effective if applied in the fall in fallow or after harvest where cropping sequence allows. High rate gives substantial stand reduction. Good choice for patch spraying in late fall. Fall regrowth should be 6 inches tall for best results. May be applied in spring prior to planting corn or sorghum or at bud stage in fallow during mid-season; however stand reduction is usually considerably less than for fall treatments. Rates lower than listed are primarily for topgrowth suppression and give very limited stand reduction. Weeds should be actively growing. $15.00-30.00/A.
			CROP ROTATION LIMITATIONS FOR BANVEL. Corn, sorghum, or soybeans may be planted in the spring after using Banvel rates to 4 pt/A the previous year. Cultivation before planting reduces risk of carryover if dry weather follows fall spraying. Corn may be planted anytime after using rates to 1 pt/A; sorghum anytime after rates to ½ pt/A. Winter or spring wheat, barley or oats may be planted anytime after using rates to ¼ pt/A; allow 45 days of unfrozen soil for each pint/A if rates over ¼ pt/A are used. Sunflowers, alfalfa, or other sensitive crops may be injured by high rates of Banvel applied the previous year. Use caution to avoid drift to sensitive crops.
	Banvel 4L + 2,4-Damine 3.8L	1-2 pt + 2-4 pt *(½-1 + 1-2 lb act)*	POSTEMERGENCE. Tank-mix. Primarily for situations where Banvel rate must be minimized to 1 pt/A to allow for certain crop rotations. Frequently mixed at the rate of 1 pt Banvel + 2 pt 2,4-D amine per acre. Amine preferred. Popular choice but less effective than full rate of Banvel alone. Banvel rates of less than 1 pt/A are primarily for topgrowth suppression. $9.50-19.00/A. Refer to section for Banvel alone for crop rotation limitations.
	Roundup 3L *(glyphosate)*	2-3 qt *(1½-2¼ lb act)*	POSTEMERGENCE. May be used before planting or after harvest for most field crops. No soil residual. Spring application before planting most row crops usually gives top-kill only. Late fall spraying following harvest can be very effective. High rate is more effective, especially for spring applications. Best control at bud-stage. Plants must be actively growing and free of drought stress. Very good choice for treating patches. Do not cultivate for 7 days after application. $45.00-67.50/A.
	Roundup 3L + Banvel 4L	1-2 qt + 1-4 pt *(¾-1½ + ½-2 lb act)*	POSTEMERGENCE. Tank-mix. Promising combination when compared to low rates of each used alone. Allows for reduced Banvel rate when planting interval is limited. Good choice for late fall using 1 to 2 pt/A Banvel + 1 qt/A Roundup. Refer to section for Roundup alone and to section for Banvel alone for crop rotation limitations and precautions. $30.00-75.00/A.
	Roundup 3L + 2,4-D 3.8L	½-2 qt + ½-2 pt *(3/8-1½ + ¼-1 lb act)*	POSTEMERGENCE. Tank-mix. Promising for situations where planting interval is short for some crops. Present labeling limited to rates of ¼ to 1 pt Roundup + ½-1 pt 2,4-D per acre. Intended only for annual weeds and topgrowth suppression of thistles. Rates of 1 to 2 qt/A Roundup plus 1 qt/A 2,4-D amine would be preferred for perennials. Offers reduced cost per acre; however stand reduction is less than for full rates of Roundup used alone. $24.50-47.50/A.

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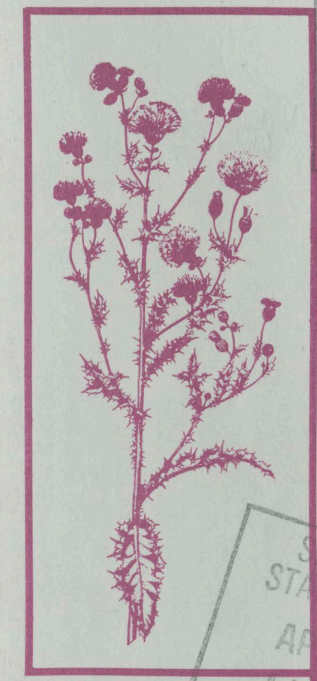

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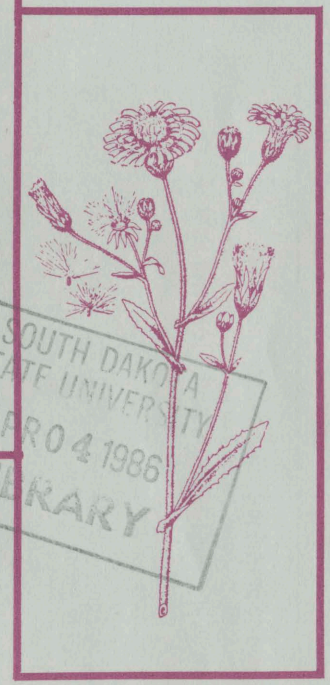

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